

Summary

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A Quarterly Information Bulletin from the Methodology Division

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Reviews Impact Positively on Commonwealth Surveys

REVIEWS IMPACT POSITIVELY ON COMMONWEALTH SURVEYS

The Statistical Clearing House (SCH) was established in 1997 to reduce the burden of Commonwealth Government surveys on businesses, by ensuring surveys do not duplicate existing collections and are of sufficient quality to warrant the burden imposed. All surveys that are conducted by or on behalf of any Commonwealth Government agency that involve 50 or more businesses are subject to clearance by the SCH.

The SCH review assesses the number of businesses to be approached for each survey to ensure minimum respondent burden. The review process also helps to ensure the design and conduct of business surveys follow best practices. We find that the SCH process is particularly beneficial to government agencies that are less familiar with running surveys.

In 2001, an increase in marketing activity lead to the SCH dealing with 263 surveys. Of these:

- 114 reviews were completed with total estimated provider load for these surveys of over 236,000 hours;
- 36 were ABS surveys;
- 67 were not reviewed even though they were in scope of the clearance process; and
- 74 were found to be out of scope of the clearance process.

While completing the reviews, SCH staff identified some common themes across surveys that needed improvement. These included:

- insufficient amount of time allocated to planning and developing surveys;
- lack of questionnaire testing;
- consultants unaware of SCH requirements; and
- poor justification of sample sizes.

In May, the SCH sent a report to each Commonwealth agency, summarising the impact of the SCH process and identifying any specific areas for improvement.

After five years of operation, the SCH review continues to make progress on its objectives. Last year, SCH reviews resulted in 13% of surveys reducing their sample sizes, which represented a reduction in respondent load estimated at around 1,380 hours. Quality improvements were made to 38% of surveys reviewed.

The SCH also maintains the Commonwealth Business Surveys Register on the SCH web site at www.sch.abs.gov.au. The Business Surveys Register contains information about all business surveys that are covered by the SCH process. It includes a description of the survey design and provides contact details for the survey manager, for each survey. The Business Surveys Register aims to: increase the awareness, quality, and use of the statistical data generated by Commonwealth government surveys, thus reducing the likelihood of survey duplication; and to facilitate the design of future surveys, by making existing designs accessible.

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Recent Analysis Board Decisions

RECENT ANALYSIS BOARD DECISIONS

The ABS analysis program is overseen by a three-member Board (the heads of the Economic Accounts, Social and Labour, and Methodology Divisions). The Board, which meets each quarter, has two main responsibilities:

- declaring, on behalf of the ABS, the problems to which our analytical effort should be directed; and
- assessing whether the outputs delivered by the analysis program are achieving the desired outcomes and, in particular, whether the prototype analytical products should find a place among the ABS's ongoing statistical products.

At its April 2002 meeting, the Board commissioned about ten staff-years' worth of new analytical work. Projects to be initiated during the coming six months include:

- Analysing melded data from the Population and Agricultural Censuses. In 2001, these two major ABS collections were run at around the same time. This suite of projects will explore ways of enriching our understanding of social and economic conditions in agriculture-based communities by analysing a melded dataset.
- Reviewing and updating the Socio-economic Indexes for Areas. SEIFA is a collection of five indexes which group Australian communities according to their social and economic conditions. The indexes are of interest in their own right; also, Australian modellers often use SEIFA as a proxy variable for socioeconomic status. This project will review the coverage, content and construction of SEIFA and will update the indexes using data from the 2001 Census.
- Analysing data on benefits payments. This project will analyse data from different sources regarding welfare transfer payments. The goal is to understand any differences between the statistical pictures painted by those data sources and, if possible, to construct a dataset that best exploits the information latent in all the sources.
- Constructing income microdata between survey years. This project will examine the possibility of modelling income distribution between the ABS's major biennial Surveys of Income and Housing Costs. The modelling might take account of data from other sources regarding income and employment, as well as information from the taxation and welfare payments systems.
- Analyses of the links between information and communications technology and business performance; analyses of venture capital; review of the composite leading indicator of economic activity.

During the next few months, Analysis Branch staff will be meeting clients and potential collaborators and reviewers to decide what each project should try to achieve and how it should be run. The Board will consider our draft project initiation plans at its June 2002 meeting. The next major tranche of analysis projects (another 8-10 staff years' worth) will be considered by the Board toward the end of 2002.

Proposals and progress reports for these and other analysis projects can be found via the Analysis "Home Page"; and summaries appear in Analysis Newsletters.

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Estimation of Seasonal Factors for a Short Time Span Using Multi-Level Modelling

ESTIMATION OF SEASONAL FACTORS FOR A SHORT TIME SPAN USING MULTI-LEVEL MODELLING

The Australian Bureau of Statistics (ABS) is continually improving the source and methods of ABS surveys. Methodological changes to the source or method of a survey can impact on the original survey estimates and time series estimates, (ie. the trend and seasonally adjusted estimates).

To assess the impact of the change of survey, a parallel survey original estimate can be calculated using data collected from the old and the new survey for one or more overlapping time periods. The number of overlapping time periods is typically short due to cost constraints. It is desirable to assist users by calculating time series estimates for the new survey but traditional seasonal adjustment methods cannot adequately calculate time series estimates for short time series.

The Time Series Analysis section has developed an approach for estimating seasonal factors for short spans of time series data. A realistic assumption is that the new survey is measuring the same underlying activity as the old survey which means that the trend movement is the same but may be at a different trend level. The seasonal factors are assumed to be different for different surveys. This information, over a number of lower level series, is used in multi-level modelling to test the seasonal factor differences between the old and new survey data over the overlapping time periods and produce seasonal factors for the new survey time series at an aggregate level.

This method has been applied to test and produce seasonal factors for the private sector gross earning component from the Quarterly Economy Activity Survey (Catalogue: 5676.0) which is the replacement of the Survey of Employment and Earnings (Catalogue: 6248.0) using four parallel quarter estimates over 2001. The result has been used in the compilation of the National Accounts.

This research will continue to be investigated by The University of Wollongong in collaboration with the ABS.

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Gatekeepers for Emerging Analytical Methods

GATEKEEPERS FOR EMERGING ANALYTICAL METHODS

As well as maintaining our traditional skills, Analysis Branch must acquire expertise in new methods - both in methods that have recently emerged in the literature and some not-so-recent methods that we have not before applied to ABS work. One scheme we are experimenting with is to appoint "gatekeepers" whose role is to develop their own understanding of the emerging field, then bring that knowledge back to the branch and to the ABS at large.

A gatekeeper's tasks include trawling the literature, and monitoring relevant Internet sites or subscribing to discussion groups, then encapsulating the emerging methods for their ABS colleagues. A gatekeeper's output may be in the form of, say, a guided, annotated reading list, a roadmap of the field, a presentation or a series of tutorials. The gatekeeper may also act as an expert technical adviser to a project team that wishes to apply the new technique.

Every six months or so, the branch lists emerging areas of analytical technique most relevant to our forward work program, and decides which it would be most worthwhile to invest in. We then call for expressions of interest from people who may act as gatekeepers in the chosen fields.

In the current trial, five gatekeepers are working on three different methodological fields: multi-level analyses; analytical methods that take account of complex survey designs; and 'natural experiments' for evaluation. The trial will run for six months with interim reports from all gatekeepers due in July 2002. The trial coordinators, Jonathon Khoo and Tala Talgaswatta, will evaluate the trial and recommend whether the scheme should be continued.

For further information on the gatekeepers trial, please contact Jonathon Khoo on (02) 6252 5443 or Tala Talgaswatta on (02) 6252 5376.

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Imputation for Non-Sampling Error in the Freight Movement Survey

IMPUTATION FOR NON-SAMPLING ERROR IN THE FREIGHT MOVEMENT SURVEY

The Freight Movement Survey (FMS) was conducted out of the Brisbane office and covered four separate modes of transport involved in freight movement: rail, sea, air and road. The road component involved a fortnightly sample survey of vehicles used for freight movement purposes. The reference period was the year beginning April 2000 through to the end of March 2001, with 26 non-overlapping fortnightly samples selected to cover the whole reference period. This article details the non-sampling error in the road component and the subsequent investigations and the final adjustment made to the data.

Selected vehicles in the road component of the FMS were asked to keep a log of trips (both laden and unladen) for the reference fortnight. During the production of estimates for the FMS, concerns were raised about the comparison between FMS results and results from the Survey of Motor Vehicle Usage (SMVU). These concerns were related to FMS results being considerably lower for the three major variables of total distance, weight carried and tonnes kilometres.

Investigations carried out into the possible reasons for this discrepancy identified the possible under-reporting of trips made during week 2 of the fortnightly cycle. Subsequent time series analysis conducted on five variables, (namely laden distance travelled, total distance travelled, weight carried, number of laden trips, and total number of trips) produced results showing strong statistical significance and consistent direction. This analysis concluded the under-reporting in week 2 for these 5 variables ranged from 5-10% with a standard error of between 1% and 2%.

Given the significance of the under-reporting in week 2, a decision was made to compensate for the discrepancy in the estimates. Conceptually, an adjustment for each of the five variables of interest was required.

Imputation of additional trip records for week 2 using donor records from week 1 was the preferred method of adjustment. An analysis of possible imputation classes was undertaken with the best performing imputation classes being based on the variable of laden distance travelled, split into three groups (less than 900 km, 900 km to 2000 km, and 2001 kms and greater).

Allocation to imputation classes was achieved using a method of minimising the difference between the intended adjustment and the expected adjustment at the imputation class level, constrained to the total level of intended adjustments as obtained from the previous analysis. A Lagrangian multiplier technique was employed to obtain a solution which enabled the allocations in each imputation class to be resolved. This technique was applied using the variables laden distance and weight carried, with imputation classes of laden distance outlined above.

The final adjustments made based on this method of imputation were within one standard error of the under-reporting identified in the time series analysis for all of the five variables with the exception of laden trips.

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A Preliminary Analysis of Changes in Unpaid Work in Australia

A PRELIMINARY ANALYSIS OF CHANGES IN UNPAID WORK IN AUSTRALIA

A preliminary analysis of changes in total hours spent on unpaid work by Australians between 1992 and 1997 was undertaken using a simple decomposition technique. The relative contribution of demographic changes and changes in patterns of time allocation between various activities were examined. The empirical findings could shed light in addressing several issues associated with the compilation of unpaid work statistics. For example, is it appropriate to extrapolate estimates of total unpaid work using population information and historical patterns of individuals' time allocation to unpaid work? If such estimates were obtained, how large are the possible biases?

The ABS has been producing statistics on unpaid work since the late 1980s and early 1990s. These estimates of unpaid work are based on Time-Use Surveys (TUS) conducted by the ABS in 1987, 1992 and 1997. As these survey based estimates are infrequent and the user community is interested in more frequent information, the ABS is interested in extrapolating estimates of unpaid work for non-survey years. This study provides some information to help evaluate the possibility of achieving this goal.

In contrast to earlier analyses, the paper examines changes in total hours spent on unpaid household work between

1992 and 1997 at a disaggregated level, and quantifies the contribution of demographic changes (a demographic effect) and changes in patterns of time allocation (a behavioural effect). Unpaid work consists of household work, and volunteer and community work.

Results reveal that demographic changes, more than changes in patterns of time allocation, are the main factors behind changes in total hours spent on unpaid work between 1992 and 1997. There were some changes in the average amount of time spent on unpaid work for males and females. However, these changes did not dramatically alter typical male and female activities.

A summary of the decomposition analysis of changes in total time spent on unpaid work for Australia between 1992 and 1997 showed three salient features: (1) the average time in unpaid work has generally decreased; (2) the number of people in major demographic categories has increased; and (3) the demographic factor has 'outplayed' the behavioural factor and the net effect on changes in unpaid work is positive.

Further, the demographic effect was decomposed into two factors: general population growth and demographic compositions. Results show that the influence of general population growth is positive and dominant for most groups, and a shift from not-employment groups to employed groups is significant, and this may reflect the Australian business cycles. However, this aggregate level decomposition analysis is unable to reveal the influence of age on demographic structure and hence on the changes in unpaid work. A future more detailed analysis could address this issue.

In general, the following conclusions were drawn from this preliminary study:

- Change in the population is the major component of change in (total) unpaid household work between 1992 and 1997.
- There were some variations in changes in the average amount of time spent on unpaid work across demographic categories. However, in general average hours in unpaid work fell between 1992 and 1997.
- There was also a demographic composition effect present with a general decline in not-employed relative to employed groups.
- The results of a preliminary simulation exercise revealed that for some groups only incorporating change in population size could produce reasonable estimates of total unpaid hours but for other groups such an assumption could lead to significant (upward) biases.

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Analysis Branch's Skill Audit 2002

ANALYSIS BRANCH'S SKILL AUDIT 2002

To undertake the ABS analysis program, we need a very diverse range of skills - not just a knowledge of modelling and other techniques, but also some understanding of the key concepts and frameworks that underlie social and economic statistics, and an appreciation of the ways statistics are applied in policy-making, business planning and research.

The objective of our 'skill audit' is to assess the supply of key analytical and associated skills. The findings from the audit are confronted with our assessment of demand (the skills needed to undertake the ABS analysis program). An understanding of current (or impending) gaps in our skill mix helps us plan our training activities for the coming year. It also helps us plan the knowledge-sharing collaborations we might form with ABS subject matter experts, other government agencies or universities. And the intelligence gathered in this way may guide our staff when they are negotiating their individual development plans.

The branch ran a pilot version of the skill audit in 2001. Based on feedback from participants and from other ABS colleagues, a new-look skill questionnaire was designed early this year, and our Skill Audit 2002 was conducted recently. Staff were asked to indicate their current competency and their needs for training across about 50 skills, grouped broadly as follows:

- Core knowledge of the ABS business (e.g. families of statistics, data collections)
- Core technical skills (e.g. regression modelling, SAS)
- Personal and management skills (e.g. project and performance management, communication, career paths)

- Specific technical skills (e.g. index theory, logistic regression, multi-level modelling)
- Knowledge of specific families of socioeconomic statistics (e.g. labour, prices, productivity)

The results are now being analysed and will be presented to the branch in the near future.

For more information about the methods or findings of our skill audit, please contact Ravi Ravindiran on (02) 6252 7039.

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Methodological News

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